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AUTHOR Fredrickson, John H.
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ABSTRACT

Conservation of energy is within the control and very much within the responsibility of educators. Schools are among the greatest "wasters" of energy in the nation today. Principals must become more knowledgeable about their buildings than they have been in the past. Indepth inspections of the school facilities will identify the most flagrant energy-wasting conditions. Corrective measures should be instituted immediately. Energy-wasting practices must also be investigated with frequent personal and published reminders advisable for staff and students. Consideration may have to be given eventually to rescheduling the entire school year. Significant quantities of energy can be conserved by closing schools earlier in spring. A case can be made to renovate a building for energy conservation purposes in conjunction with a well-established need for facility improvement to meet changing educational requirements. To accomplish this, educational priorities must be assessed, available physical resources evaluated, and major decisions made followed by appropriate action. (Author/MLF)

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FACILITIES RECYCLING FOR ENERGY CONSERVATION

By

DR. JOHN H. FREDRICKSON
School Facilities Consultant
Middleton, Wisconsin

I hope that we can agree that the energy crisis in America is a reality. While we, as a nation, constitute only about six percent of the world's population, we manage to consume over thirty percent of the world's energy needs annually. And since the experts are now predicting that our natural gas reserves will cease to exist in ten to fifteen years, our oil supplies in twenty to thirty years, and that any significant use of solar, geothermal or fusion energy is years away, we are indeed faced with an "energy gap" both in our society and in our schools. In fact, there is a very real possibility that all our state and federal institutions may be required to replace gas-fired boilers in the future and that natural gas will be restricted to domestic use only.

While such decisions are out of the hands of educators, conservation of energy is within their control and very much within their responsibility. This is particularly important, because schools are among the greatest "wasters" of energy in the nation today. Along with the inefficient use of many of our heating and cooling systems, as well as the many systems which are just plainly inefficient themselves, we are confronted with giant heating and cooling losses through ill-fitting doors and windows, and poorly insulated walls and ceilings.

And this is not to mention the generally carefree use of energy sources by students and staff alike. Vast amounts of

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fuel and electricity are squandered every year in the schools of our nation and strategies must be developed now in order to guarantee effective energy conservation at the local level in the future.

Having stated the problem, let us now consider some possible solutions. To begin, principals must become more knowledgeable about their buildings than they have been in the past. For too long schools and their facilities have been taken for granted and their operation left almost entirely to the staff and non-professional personnel. In order to reverse this situation, it will be necessary for principals to become conversant with all of the physical aspects of their schools.

THE BUILDING

Frequent room-by-room inspections of the school facilities should become routine. These inspections would include walls, windows, floors, ceilings, lighting, ventilators, thermostats, and machinery and equipment. Such in-depth inspections will identify the most flagrant energy-wasting conditions. And discovery of these problems should then result in prompt notification of the head custodian or the buildings and grounds personnel at the central office. Except in unusual cases, corrective measures should be instituted immediately. And a follow up is appropriate. Along with these physical plant inspections, the principal should also obtain and review the "as-built" drawings of the school and become familiar with them and the mechanical systems.

THE STAFF

In addition to checking the building for energy-wasting conditions, energy-wasting practices must also be investigated.

These involve such things as open windows during significant heating and cooling cycles, tampering with thermostats, lighting left on in vacant rooms, equipment and machinery left running, and inordinate use of water. A portion of the staff in-service program might well be devoted to these kinds of problems and frequent personal and published reminders would be advisable. Students should also be admonished regarding energy-wasting practices and the student council could be a useful vehicle for this activity.

THE FUTURE

Though drastic indeed, consideration may have to be given eventually to re-scheduling the entire school year, and thus re-structuring courses and extra-curricular activities in a continuing effort to conserve vital energy. Contrary to the conventional wisdom of closing schools for extended winter vacations to save fuel, an impressive case has been made for conserving significant quantities of energy by closing schools earlier in spring. Because a virtually total shutdown of the physical plant is possible in May, vis-a-vis only a partial shutdown in December or January, considerable savings of both fuel and electricity can be accomplished. Given this fact, all school-related activities, including all evening events, would have to be re-structured to fit the new parameters. If serious attention is given to the problem of energy conservation today, perhaps these radical measures will never need to be implemented.

THE PRESENT

For the present, building principals and custodial personnel must take all necessary steps to guarantee that their

schools are functioning at maximum energy efficiency. The following activities, therefore, should be undertaken:

1. Conduct the physical inspections mentioned earlier.
2. Determine both the effectiveness and efficiency of all building mechanical systems.
3. Close blinds or shades during periods of extremely cold or hot weather.
4. Review temperature settings of all thermostats and lower them based on function and learning efficiency.
5. Establish lighting levels which will support specific learning and working tasks.
6. Reduce illumination levels in auditorium, cafeteria, gym and all well-traveled hallways.
7. Adjust energy control systems for appropriate nighttime and weekend setback.
8. Keep all outside air dampers closed when the building is unoccupied.
9. Reduce outside air intake mixtures to minimum code level.
10. Re-evaluate building requirements for morning warm-up.
11. Set temperature on water heaters for kitchen and washroom use to lower levels.
12. Schedule major portion of custodial activities for daytime or late afternoon operation.
13. Consider the re-structuring of the school day and year.
14. Spend some money and have a complete "energy audit" done.
15. Investigate the feasibility of a building renovation.

RECYCLING OF FACILITIES

While it might be virtually impossible to convince anyone that a building should be renovated strictly for energy conservation purposes, an excellent case can be made to do so in conjunction with a well-established need for facility improvement to meet changing educational requirements.

But how do we go about this "recycling" of existing edu-

cational facilities in order to effectively satisfy the need to meet changing educational requirements? Simply stated, we must assess our educational priorities, evaluate our available physical resources, make some major decisions, and then take appropriate action.

NEEDS ASSESSMENT

Aside from the energy question or even the enrollment question, the only purpose for educational construction should be the improvement of the curriculum and its delivery systems. And this is as true for institutions of higher education as it is for elementary and secondary education. Therefore, a long-range plan must be developed that will reflect investigations of the following problem areas:

1. Educational Philosophy and Objectives

All governing policies should be re-examined periodically to insure their continued validity and to determine whether they have been properly implemented in the past.

2. Present Educational Programs and Practices

Any plan for educational improvement must involve a thorough review of present activities.

3. Current Educational Trends and Legislation: State & Federal

Motivation or demand for educational change is most often generated by outside forces.

4. Educational Expectations of the Local Community

Community involvement in long-range educational planning is now virtually mandatory.

Having accomplished the above investigations and developed a long-range plan, the next step is to write educational specifications for the "recycling" project. Educational specifi-

cations are the detailed written documents from which school architects create final school drawings and cost estimates. The development of these educational specifications or program requirements will be the collective responsibility of administrators, teachers, non-professional personnel, citizens and outside educational consultants.

While the scope and sequence of educational specifications may vary in light of the particular project, the document should address itself to the following concerns:

1. Statement of Philosophy
2. Grade or Class Levels to be Accommodated
3. Enrollment Capacity Expectations
4. Curricular Programs and Activities
5. Specific Utilization Plans
6. Instructional Procedures
7. Teaching Space Requirements
8. Specialized Instructional Facilities
9. Auxiliary Areas or Facilities
10. Miscellaneous Concerns
11. Closing or Summary Statement

RESOURCE EVALUATION

After the program requirements have been developed, they should be applied to the actual structure to determine how much building modification may be necessary or even possible. Assuming the existing structure will accommodate the educational specifications, the next step is to ascertain whether the building can be renovated or "recycled" structurally and done so economically. To begin, interior renovation of a facility planned to serve for only a limited time is a poor

investment. Unless such facilities can be expected to serve effectively as a learning territory for at least fifteen years or more, the required funds would be better allocated to new construction or another renovation project. Major structural renovation should be designed for twenty-five or more years of satisfactory use and major additions to existing school plants should be expected to perform adequately well into the 21st Century. Even minor refurbishing should guarantee worthwhile service for a period of at least five years.

Today there are many sources of information and procedures for evaluating existing educational structures. Among them are the American Institute of Architects' School Plant series on Remodeling, the Educational Facilities Laboratories' publications "To Build Or Not To Build" and "New Life For Old Schools," the Linn-McCormick Rating Chart, the Michigan State Obsolescence Survey Folder, Sumption-Landes Work Book, and the Wisconsin Durability-Functionality-Adaptability Scales, of which the writer is author.

DECISION-MAKING

Now a competent, school architect should be engaged. A number of architectural firms with strong renovation records should be contacted and invited to interview. Each firm should be required to present photographs, floor plan designs, and total construction time and cost data for its most recent educational renovation projects. They should also welcome direct inquiry with other institutions with regard to their overall cooperation and successful completion of contracted work. Because renovation or recycling programs are quite different from new construction projects, special care should

be taken in selecting an architect as well as the building contractor later on.

Having engaged an architect, he or she should be brought up to date on all of the local planning activities and be supplied with copies of the "as-built" drawings and the new educational specifications. Once familiar with the totality of the undertaking, the architect should commission appropriate professional assistance such as structural, electrical, plumbing, and heating and ventilating engineers to conduct in-depth examinations and evaluations of the superstructure, building components and materials, and the various mechanical systems. Needless to say, energy conservation matters should be key concerns during all of these evaluations and deliberations. When the architect has received and reviewed the reports of these consulting engineers, he or she will then calculate the estimated total time and cost of the proposed "recycling" and present these figures and recommendations to school officials for their consideration.

ACTION PLAN

It is now the responsibility of the decision-makers to review all data gathered or produced during the entire planning process and take appropriate action. While the initial commitments to improving the curriculum and its delivery systems, the assessing of educational needs, and the evaluating of the physical resources were imperative to the success of the project, the architect's report and recommendations are pivotal. If, in his or her judgment, the recycling is not structurally or economically feasible, the project should be abandoned. If, on the other hand, the architect finds the

renovation is structurally and economically justified, the undertaking should be approved.

CONCLUSIONS

The recycling of existing educational facilities, both for the conservation of energy and the improvement of education, is a viable alternative to the generally more expensive route of new construction. If the techniques and suggestions described in this paper are followed, fine old buildings of the past will indeed fulfill the educational and energy requirements of the future.